COMPENSATED SONIC WITH INTEGRATED TRANSIT TIME LOG

Weatherford®

COMPANY	SHAKESPEARE OIL COMPANY
WELL	UNRUH 1-13
FIELD	WILDCAT
PROVINCE/COUNTY	SCOTT
COUNTRY/STATE	UNITED STATES / KANSAS
LOCATION	2540' FNL & 520' FWL SE SW SW NW

SEC	TWP	RGE	Other Services
13	16S	34W	MPD/MDN
API Number 15-171-20950			MAI/MFE
Permit Number			MML

Permanent Datum G.L., Elevation 3106 feet	Elevations:	feet
Log Measured From KB	KB	3113.00
Drilling Measured From K.B. @ 7 FEET	DF	3112.00
	GL	3106.00

Date	29-JUN-2013			
Run Number	ONE			
Service Order	3539945			
Depth Driller	4850.00	feet		
Depth Logger	4848.00	feet		
First Reading	4835.00	feet		
Last Reading	260.00	feet		
Casing Driller	262.00	feet		
Casing Logger	260.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.30 lb/USg	53.00 CP		
PH / Fluid Loss	10.00	8.80 ml/30Min		
Sample Source	FLOW LINE			
Rm @ Measured Temp	0.55 @ 78.0	ohm-m		
Rmf @ Measured Temp	0.44 @ 78.0	ohm-m		
Rmc @ Measured Temp	0.66 @ 78.0	ohm-m		
Source Rmf / Rmc	CALC	CALC		
Rm @ BHT	0.37 @115.0	ohm-m		
Time Since Circulation	4 HOURS			
Max Recorded Temp	115.00	deg F		
Equipment / Base	13096	LIB		
Recorded By	D. COLE			
Witnessed By	S. DAVIS			
JOB#	LB13-188			

Last Edited: 29-JUN-2013 20:04

BOREHOLE RECORD

Bit Size inches	Depth From feet	Depth To feet
7.875	262.00	4850.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	262.00	23.00

REMARKS

- SOFTWARE ISSUE: WLS 13.05.9583.
- MCG, MML, MDN, MPD, MFE, MSS, MAI RUN IN COMBINATION.
  - HARDWARE: DUAL BOWSPRING USED ON MDN.
  0.5 INCH STANDOFF USED ON MFE.
  TWO 0.5 INCH STANDOFFS USED ON MSS.
  0.5 INCH STANDOFF USED ON MAI.
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY.
- BOREHOLE RUGOSITY, TIGHT PULLS, AND WASHOUTS WILL AFFECT DATA QUALITY.
- ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.
- TOTAL HOLE VOLUME FROM TD TO SURFACE CASING: 2210 CU. FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH CASING FROM TD TO SURFACE CASING: 1450 CU. FT.

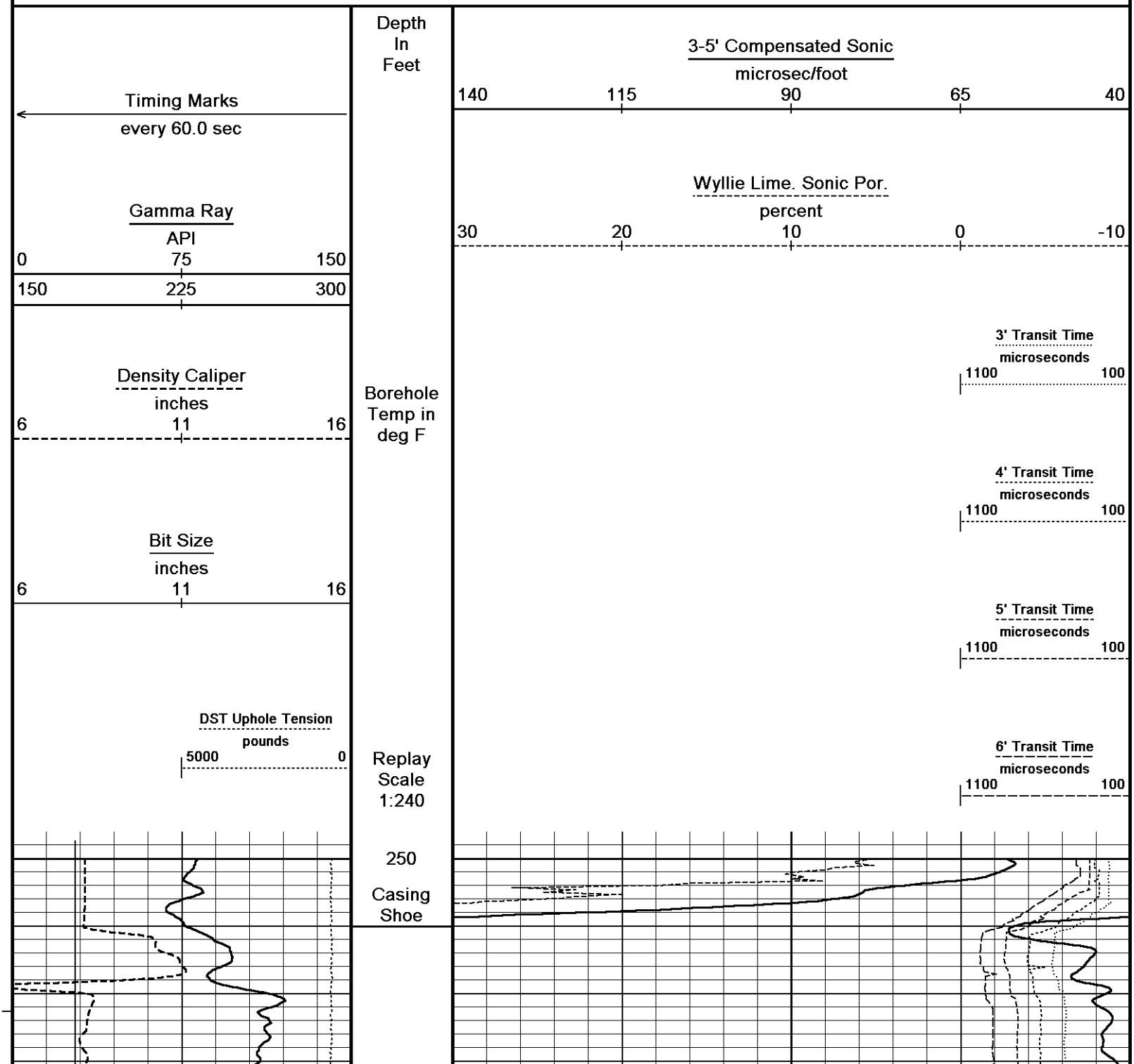
- RIG: HD DRILLING #3

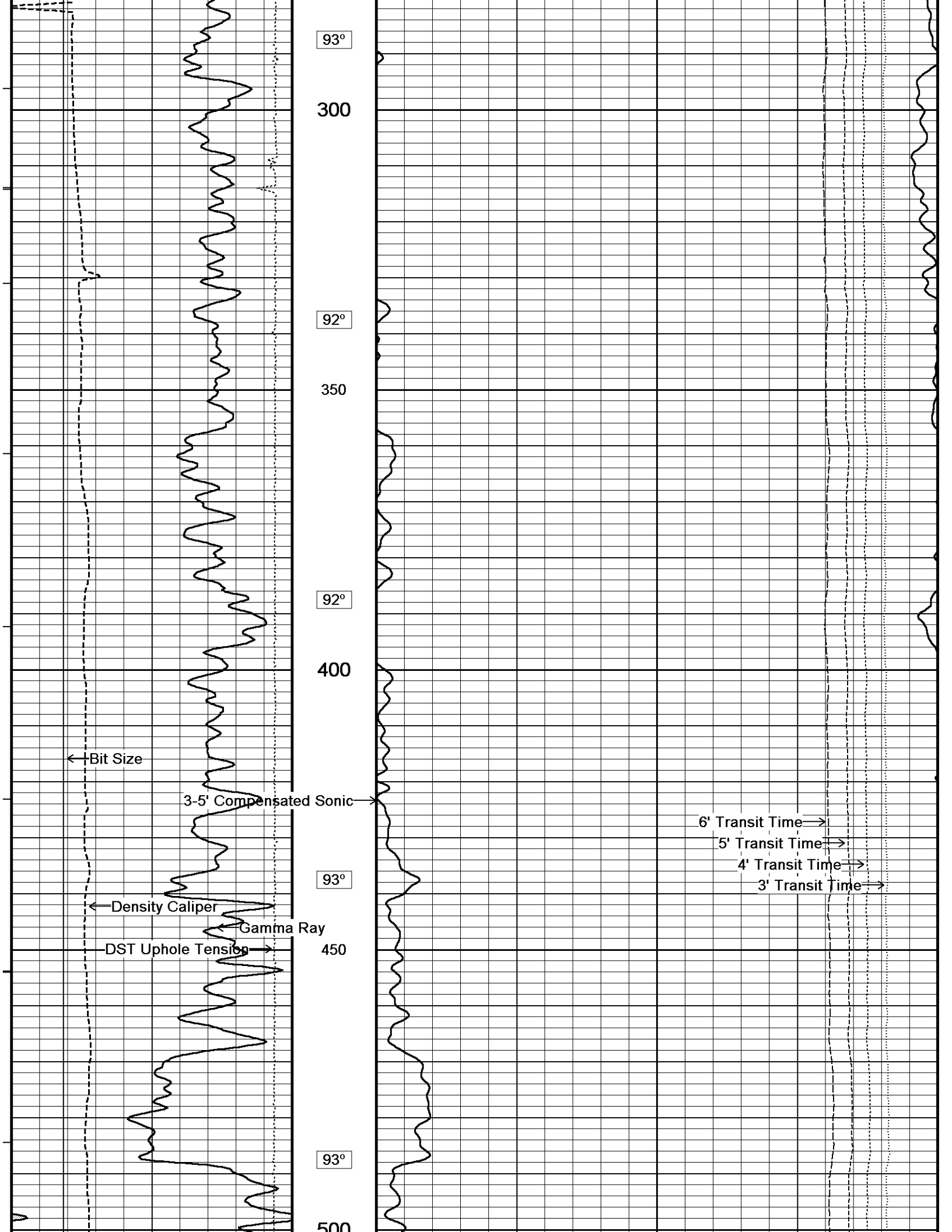
- ENGINEER: D. COLE

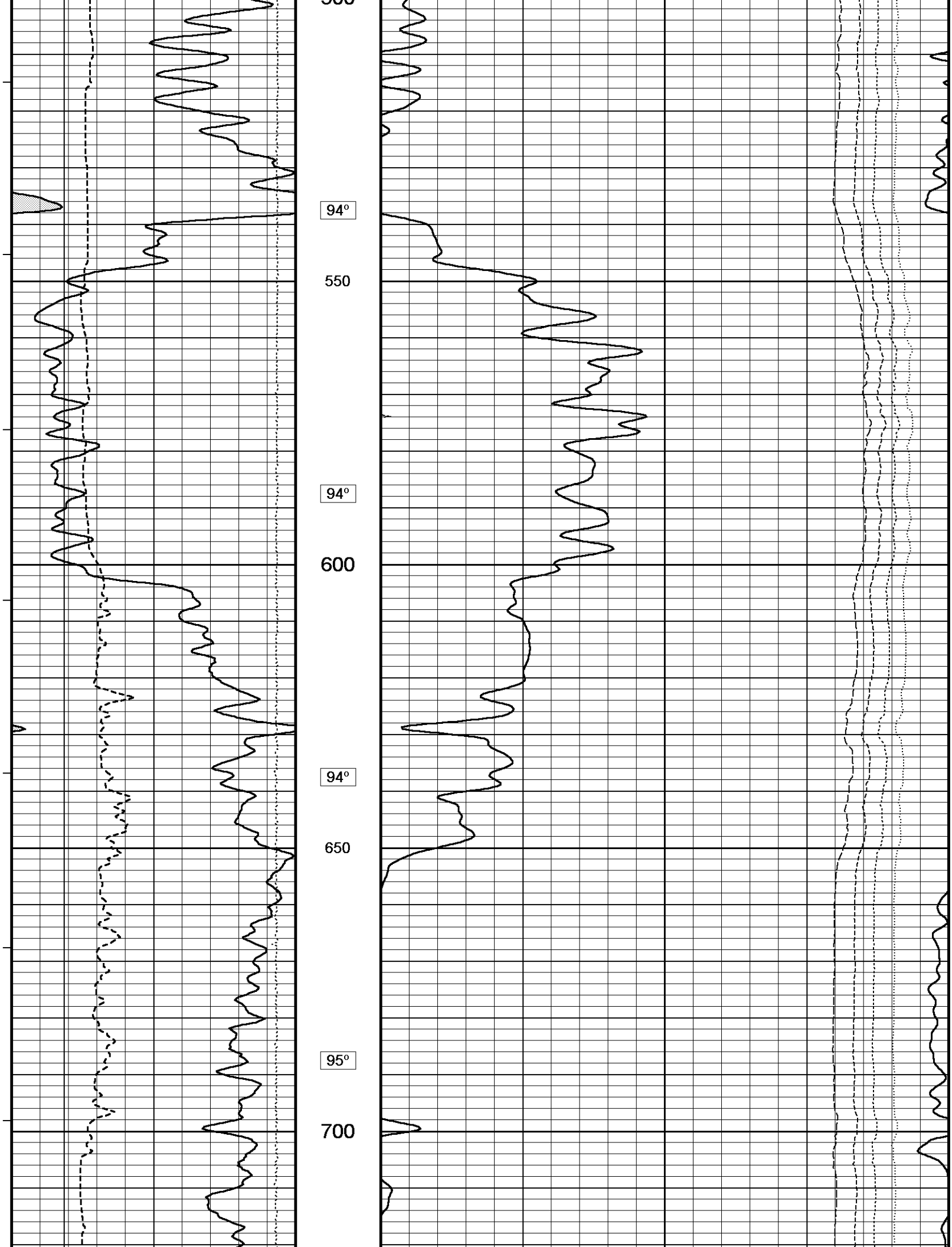
- OPERATOR(S): B. REEVES AND C. RIMEREZ

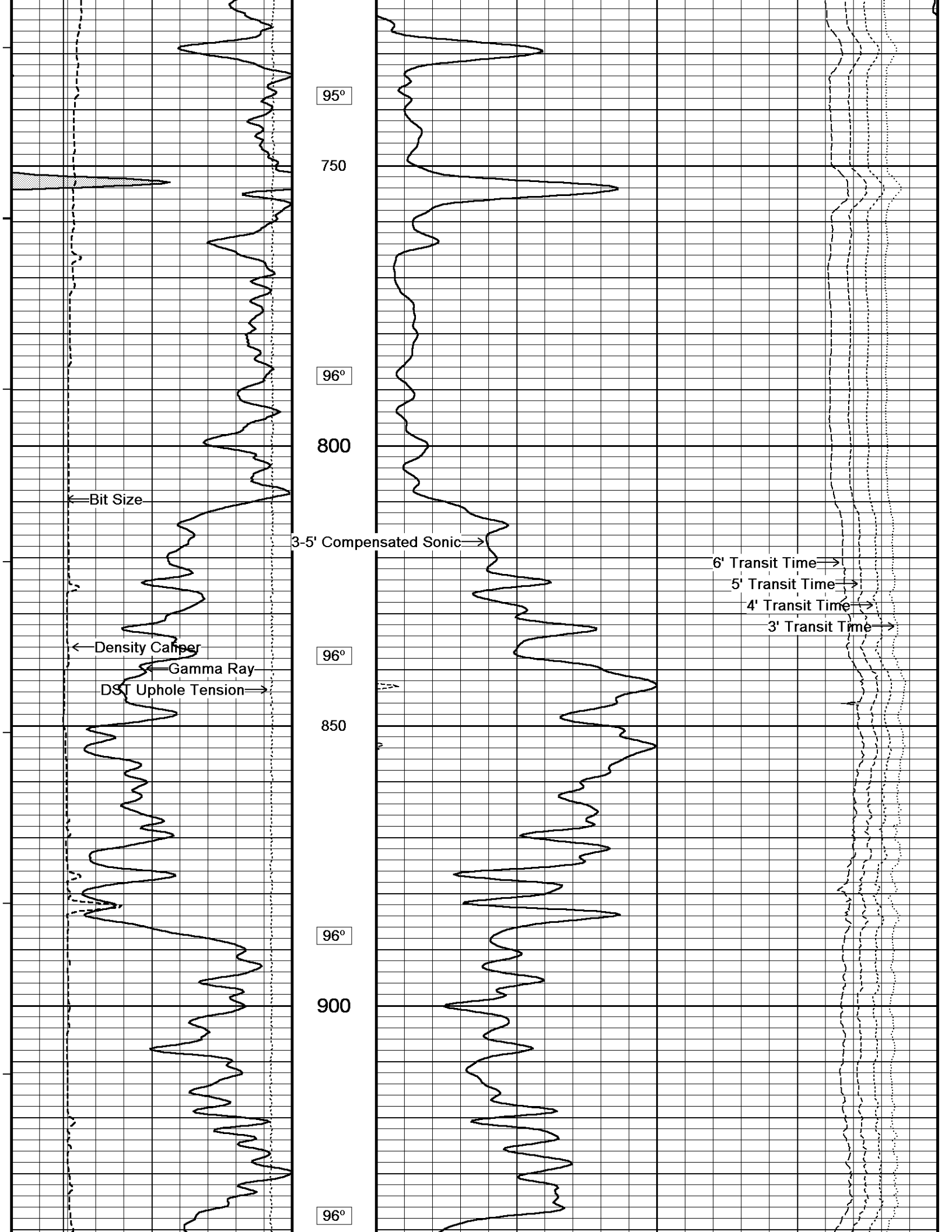
5 INCH MAIN

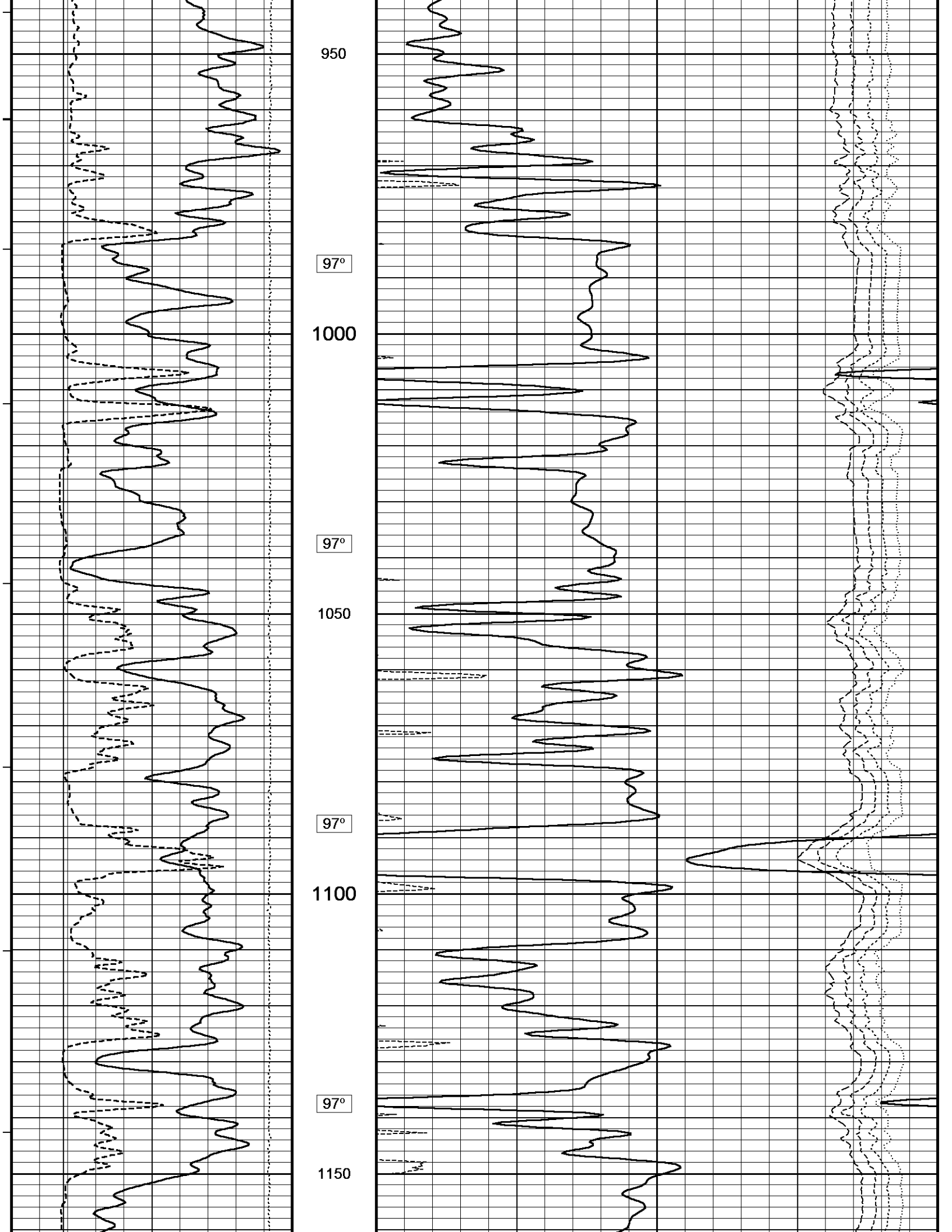
Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 30-JUN-2013 01:23
Filename: C:\Minimus 13.05.9583\Log\Shakespeare Unruh 1-13\Unruh 1-13 MAIN.dta
Recorded on 29-JUN-2013 21:40
System Versions: Logged with 13.05.9583 Plotted with 13.05.9583

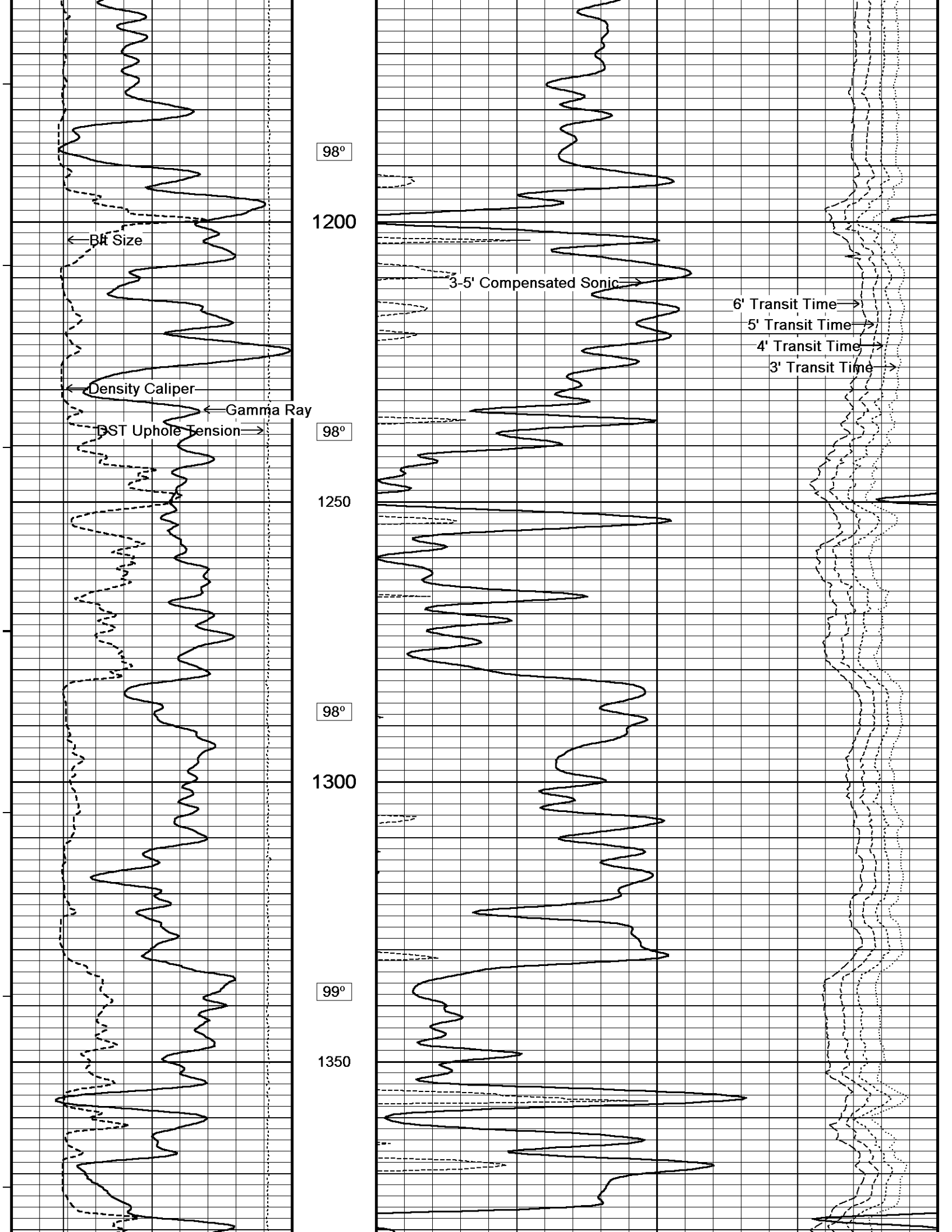


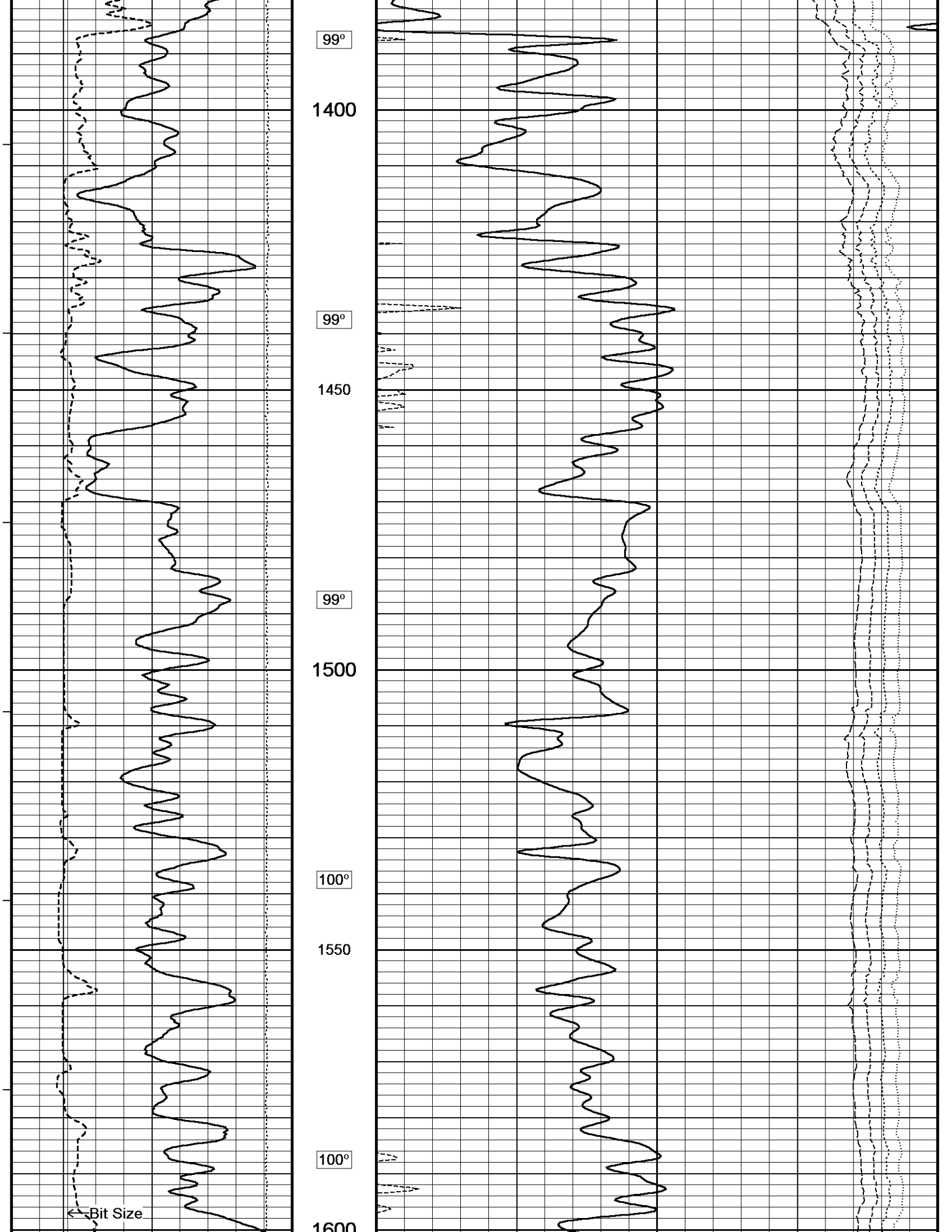

93°
300
92°
350
92°
400
Bit Size
3-5' Compensated Sonic
6' Transit Time
5' Transit Time
4' Transit Time
3' Transit Time
93°
Density Caliper
Gamma Ray
DST Uphole Tension
450
93°
500

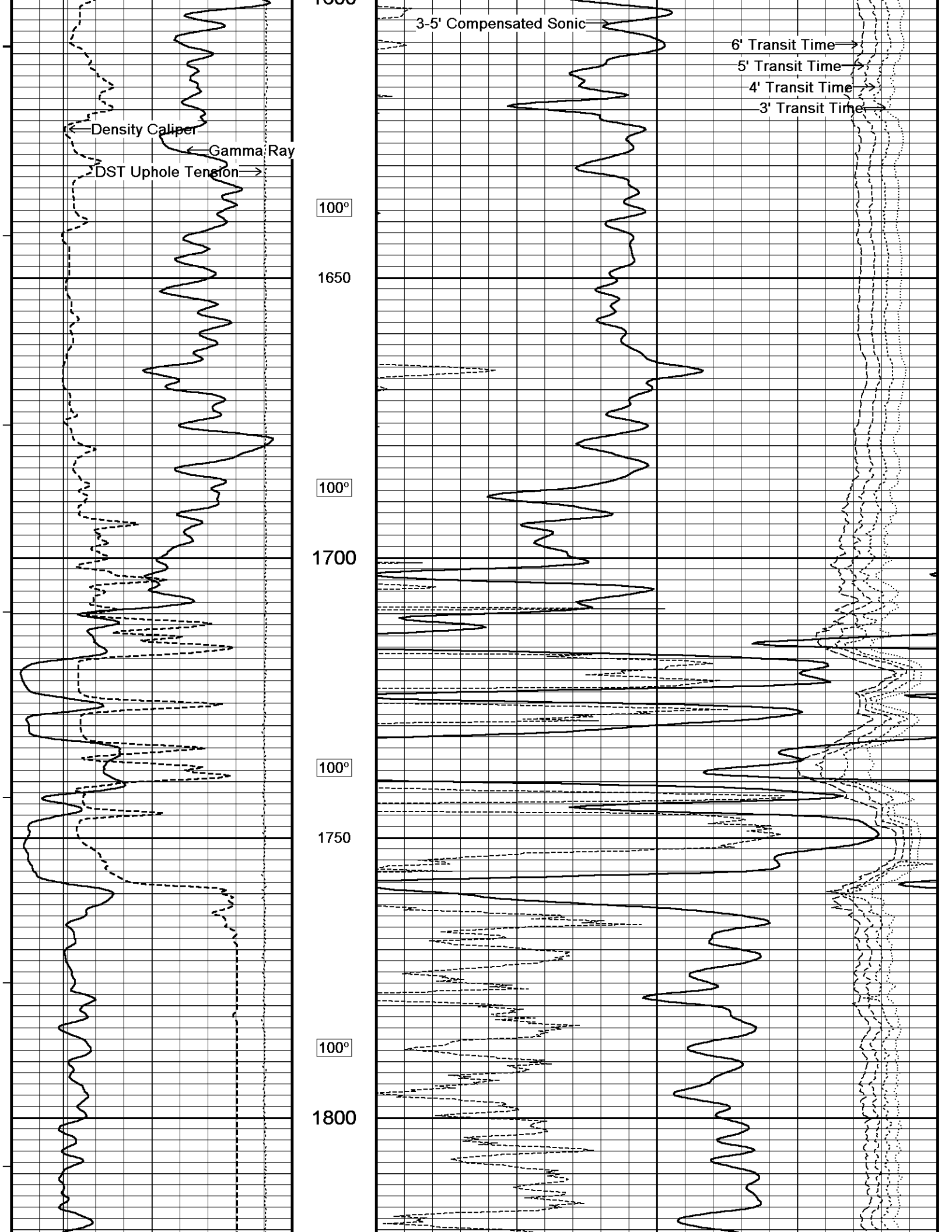

94°
550
94°
600
94°
650
95°
700

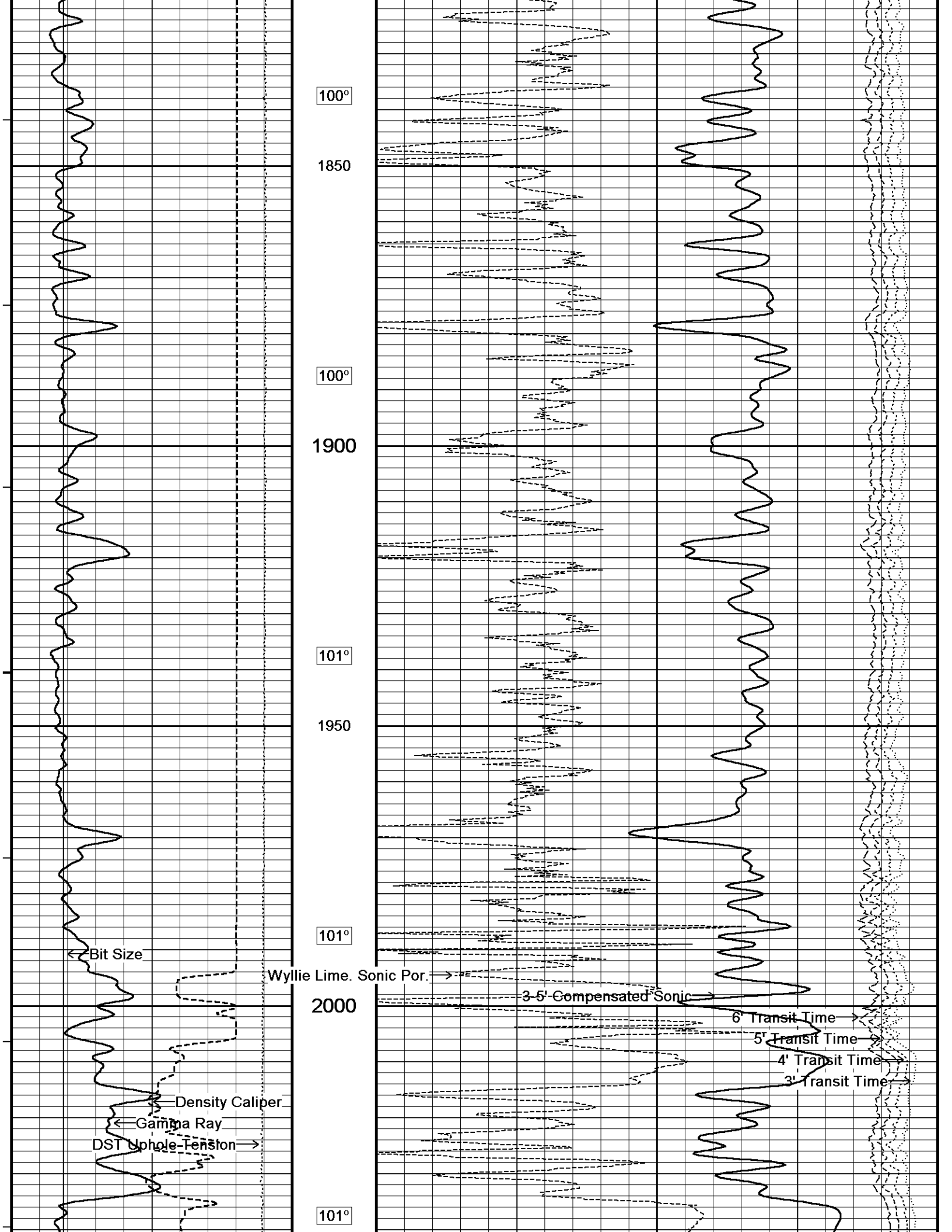

95°
750
96°
800
Bit Size
3-5' Compensated Sonic
6' Transit Time
5' Transit Time
4' Transit Time
3' Transit Time
Density Caliper
96°
Gamma Ray
DST Uphole Tension
850
96°
900
96°

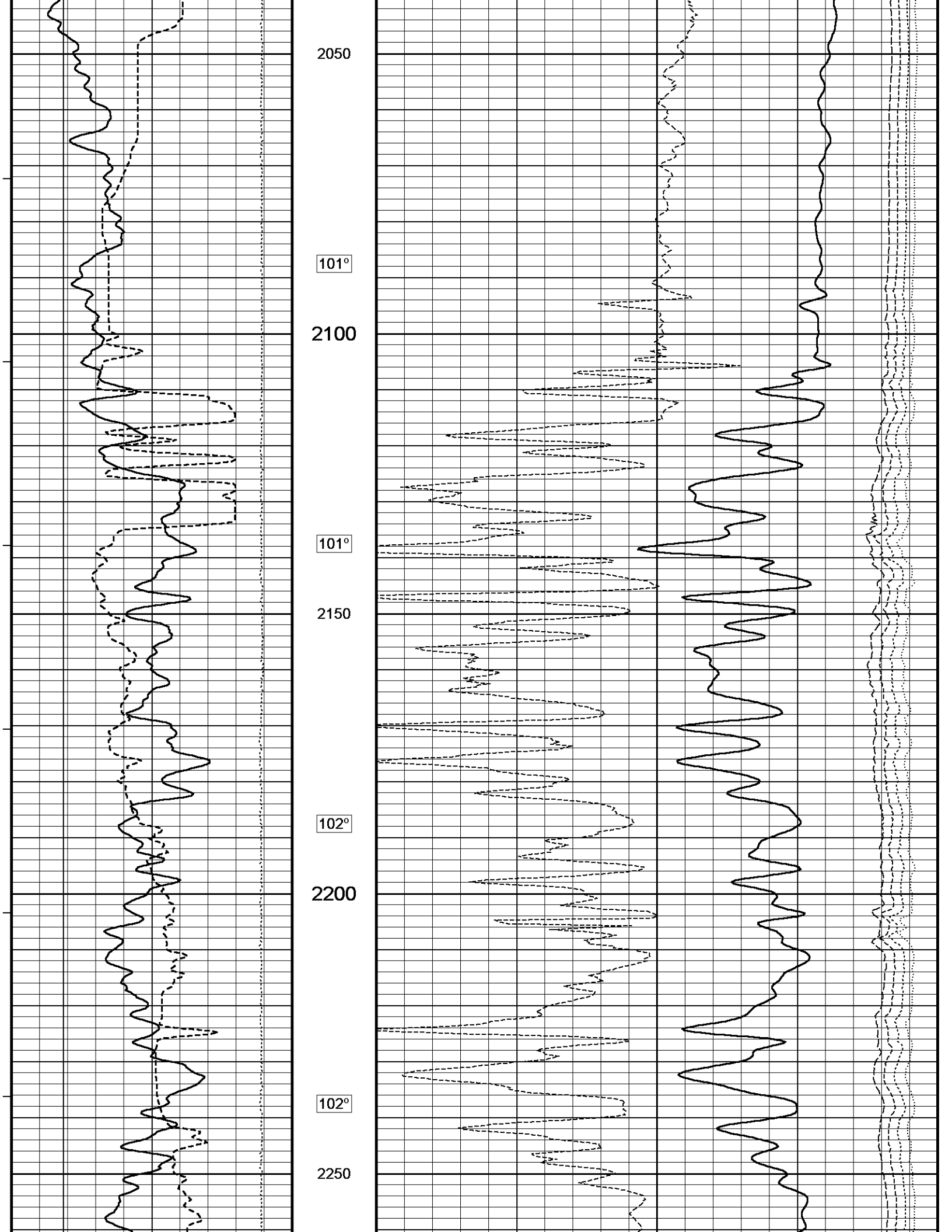

950
97°
1000
97°
1050
97°
1100
97°
1150

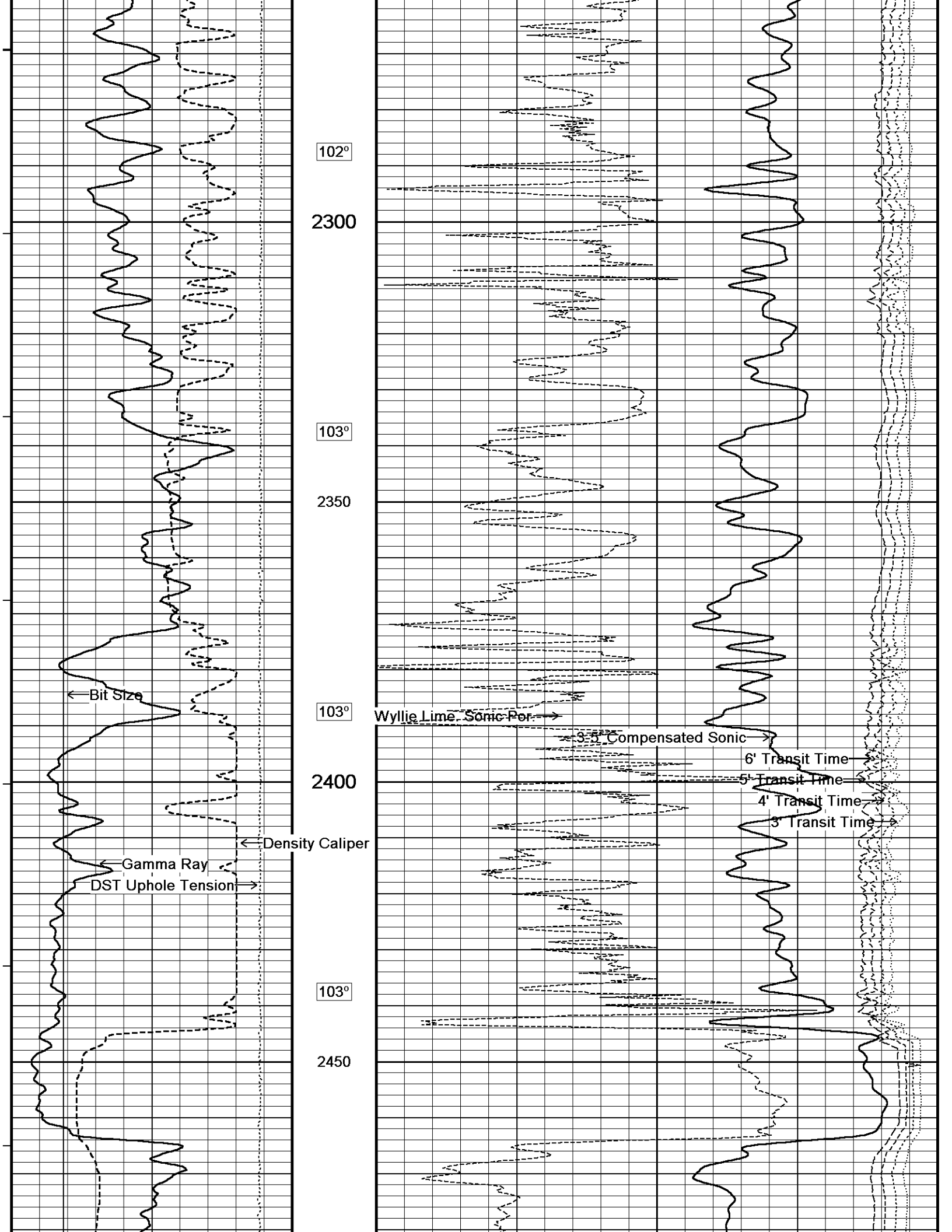

98°
1200
Bit Size
3-5' Compensated Sonic
6' Transit Time
5' Transit Time
4' Transit Time
3' Transit Time
Density Caliper
Gamma Ray
DST Uphole Tension
98°
1250
98°
1300
99°
1350

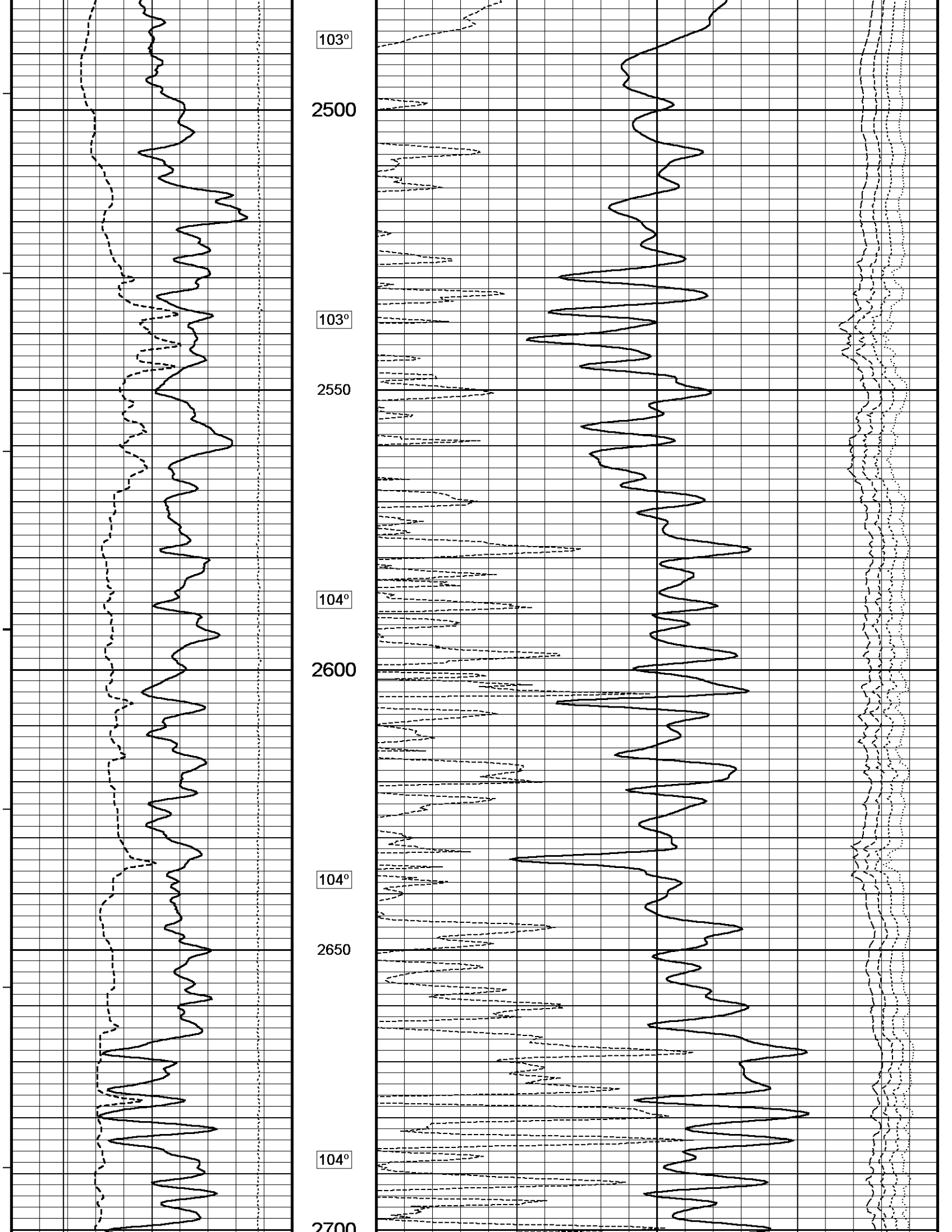

99°
1400
99°
1450
99°
1500
100°
1550
100°
1600
Bit Size

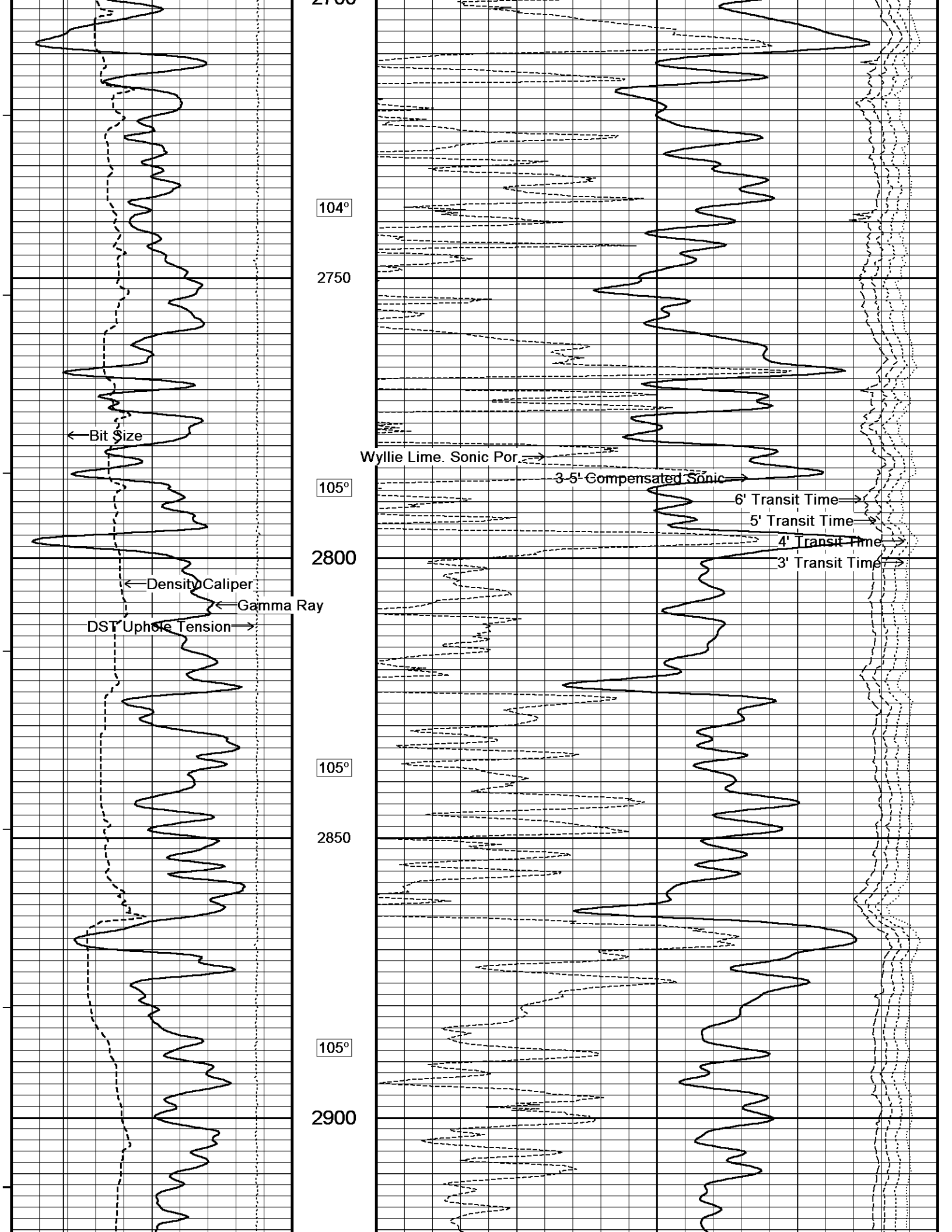

3-5' Compensated Sonic
6' Transit Time
5' Transit Time
4' Transit Time
3' Transit Time
Density Caliper
Gamma Ray
DST Uphole Tension
100°
1650
100°
1700
100°
1750
100°
1800

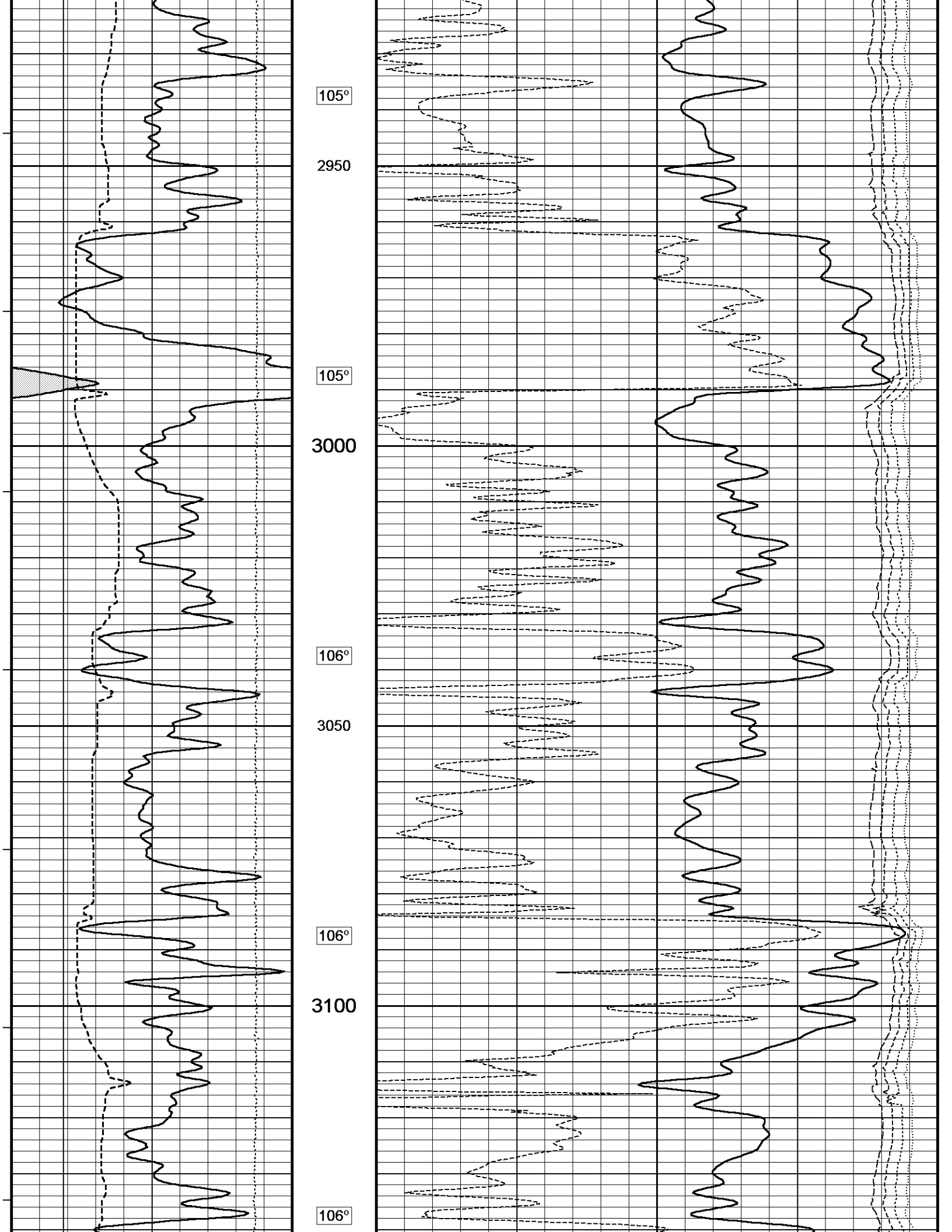

100°
1850
100°
1900
101°
1950
101°
Bit Size
Wyllie Lime. Sonic Por.
3-5' Compensated Sonic
2000
6' Transit Time
5' Transit Time
4' Transit Time
3' Transit Time
Density Caliper
Gamma Ray
DST Uphole-Tension
101°

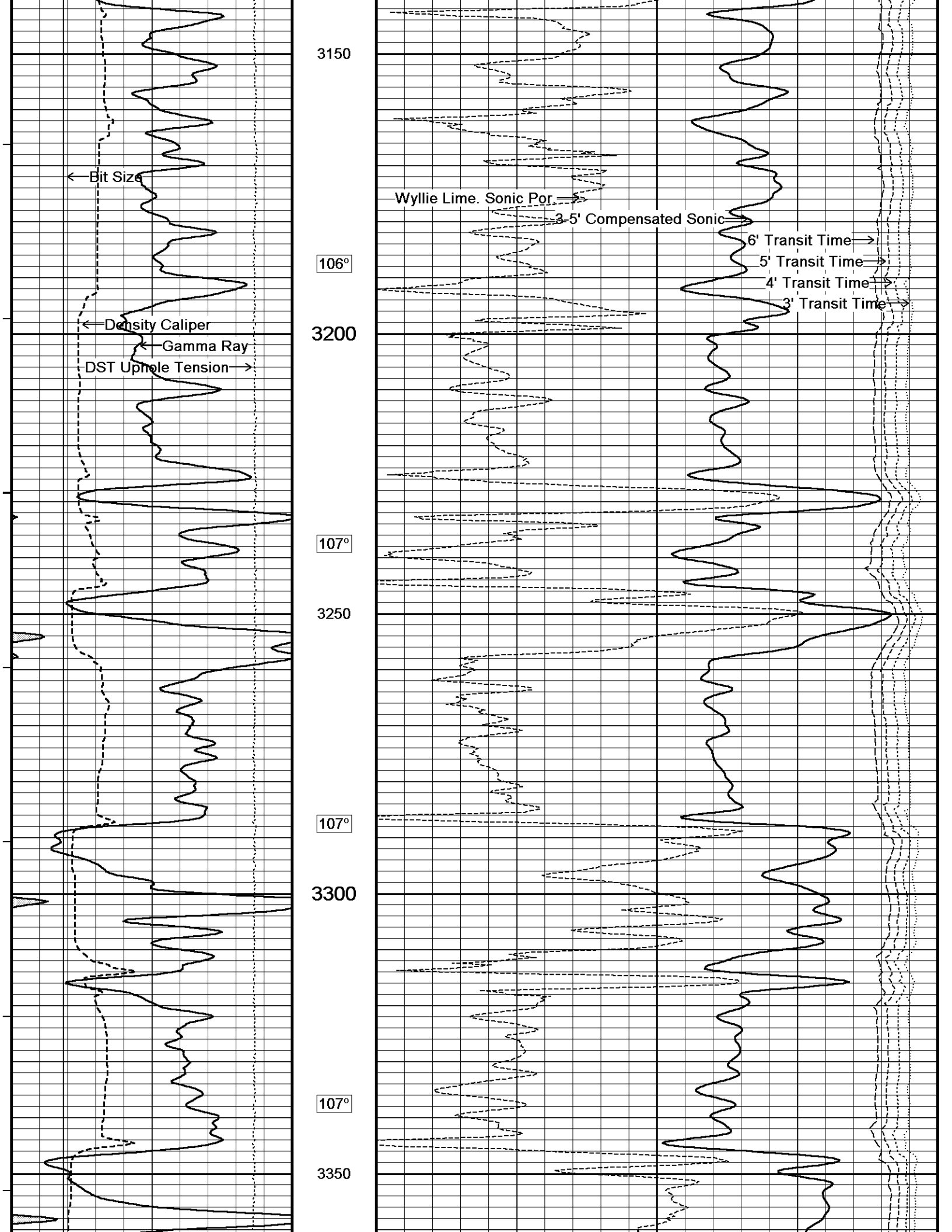

2050
101°
2100
101°
2150
102°
2200
102°
2250

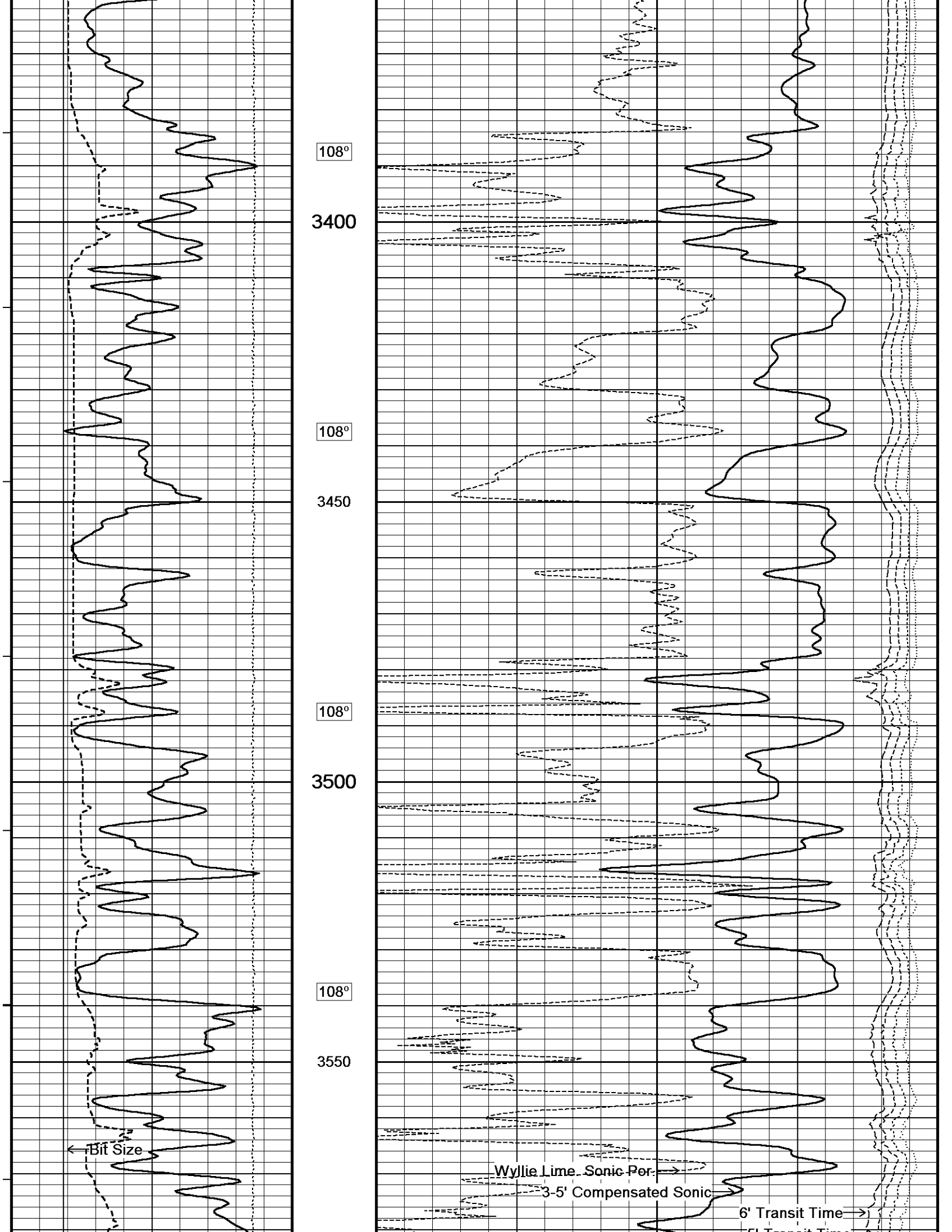

102°
2300
103°
2350
Bit Size
103°
Wyllie Lime. Sonic Por.
3-5 Compensated Sonic
6' Transit Time
5' Transit Time
4' Transit Time
3' Transit Time
2400
Density Caliper
Gamma Ray
DST Uphole Tension
103°
2450

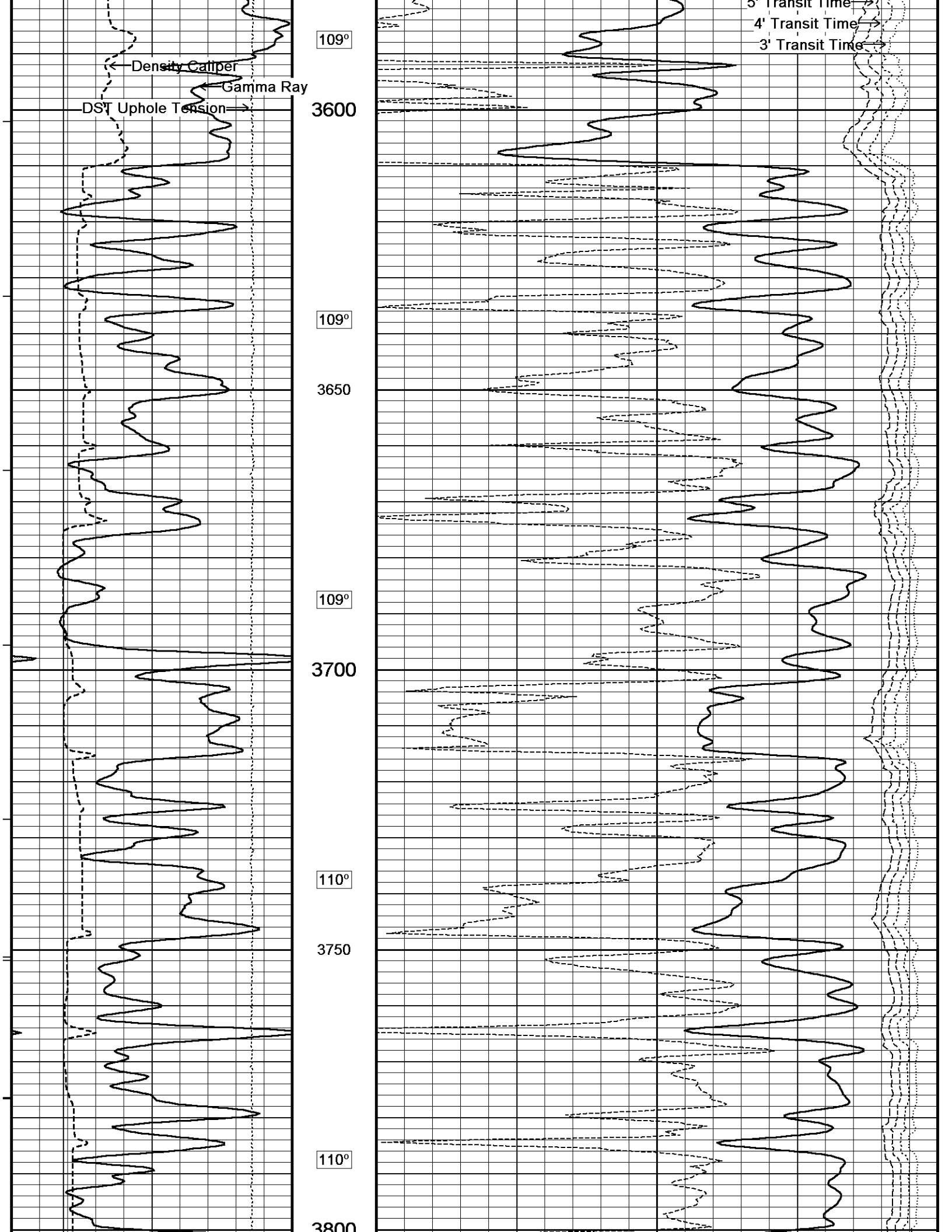

103°
2500
103°
2550
104°
2600
104°
2650
104°
2700

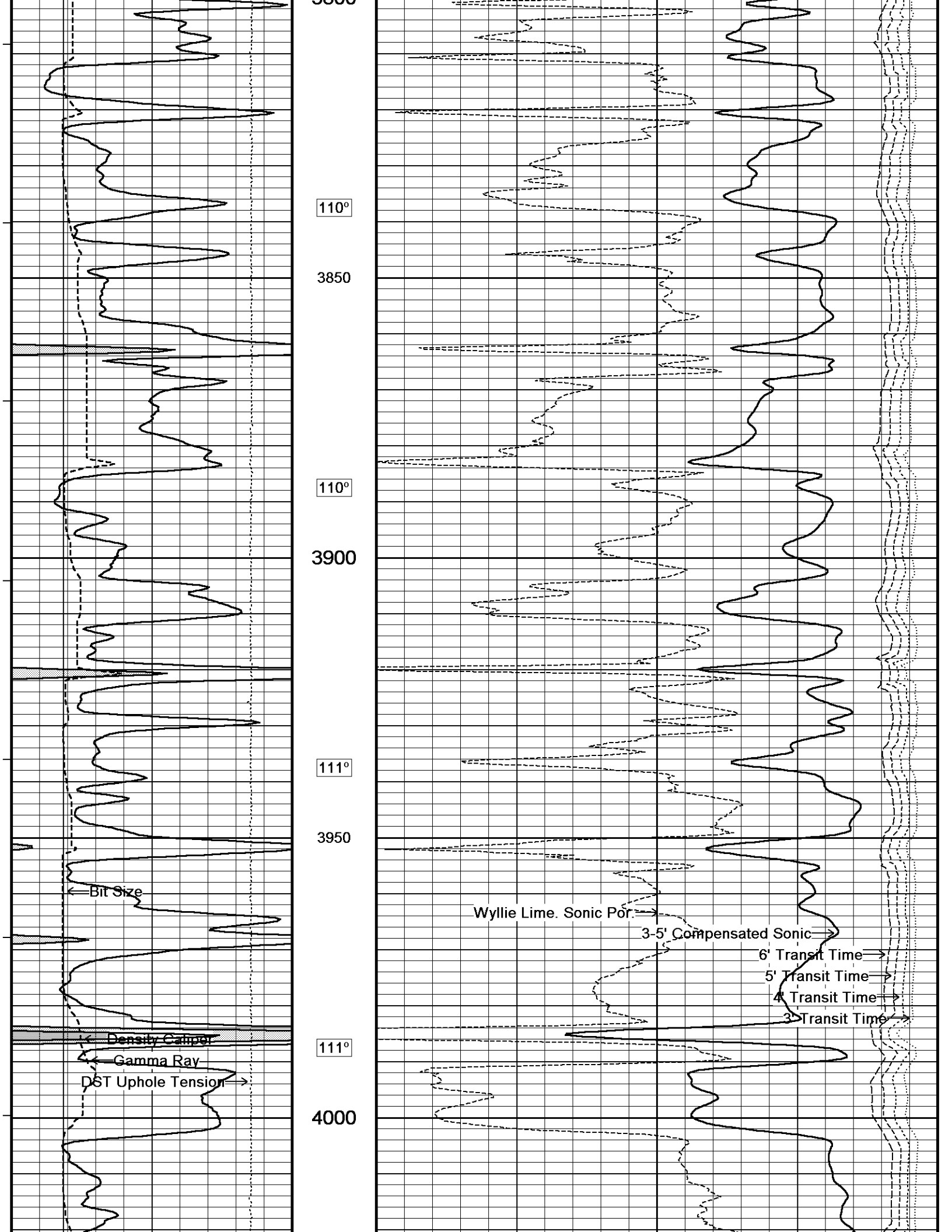

104°
2750
Bit Size
Wyllie Lime. Sonic Por.
3-5' Compensated Sonic
105°
6' Transit Time
5' Transit Time
4' Transit Time
3' Transit Time
2800
Density Caliper
Gamma Ray
DST Uphole Tension
105°
2850
105°
2900

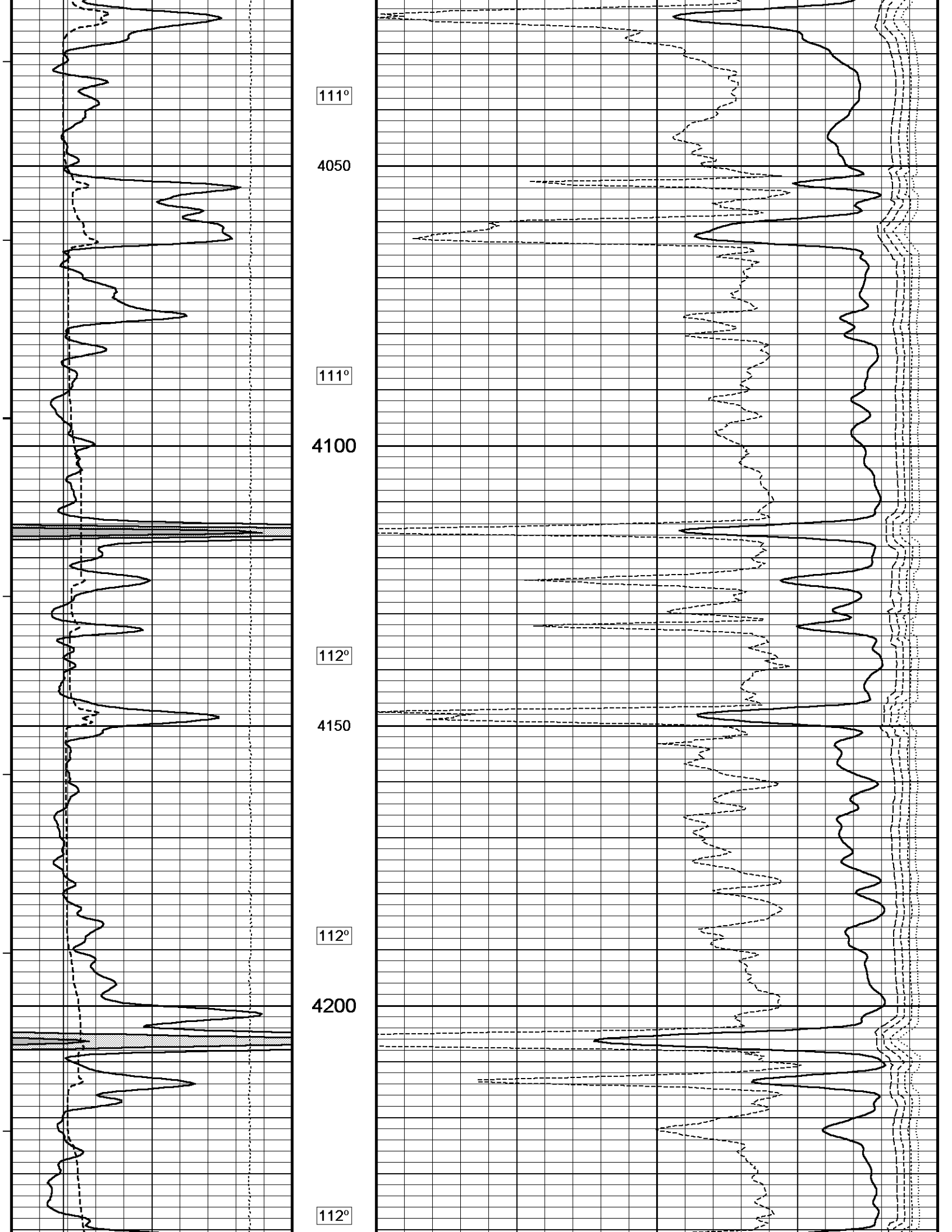

105°
2950
105°
3000
106°
3050
106°
3100
106°

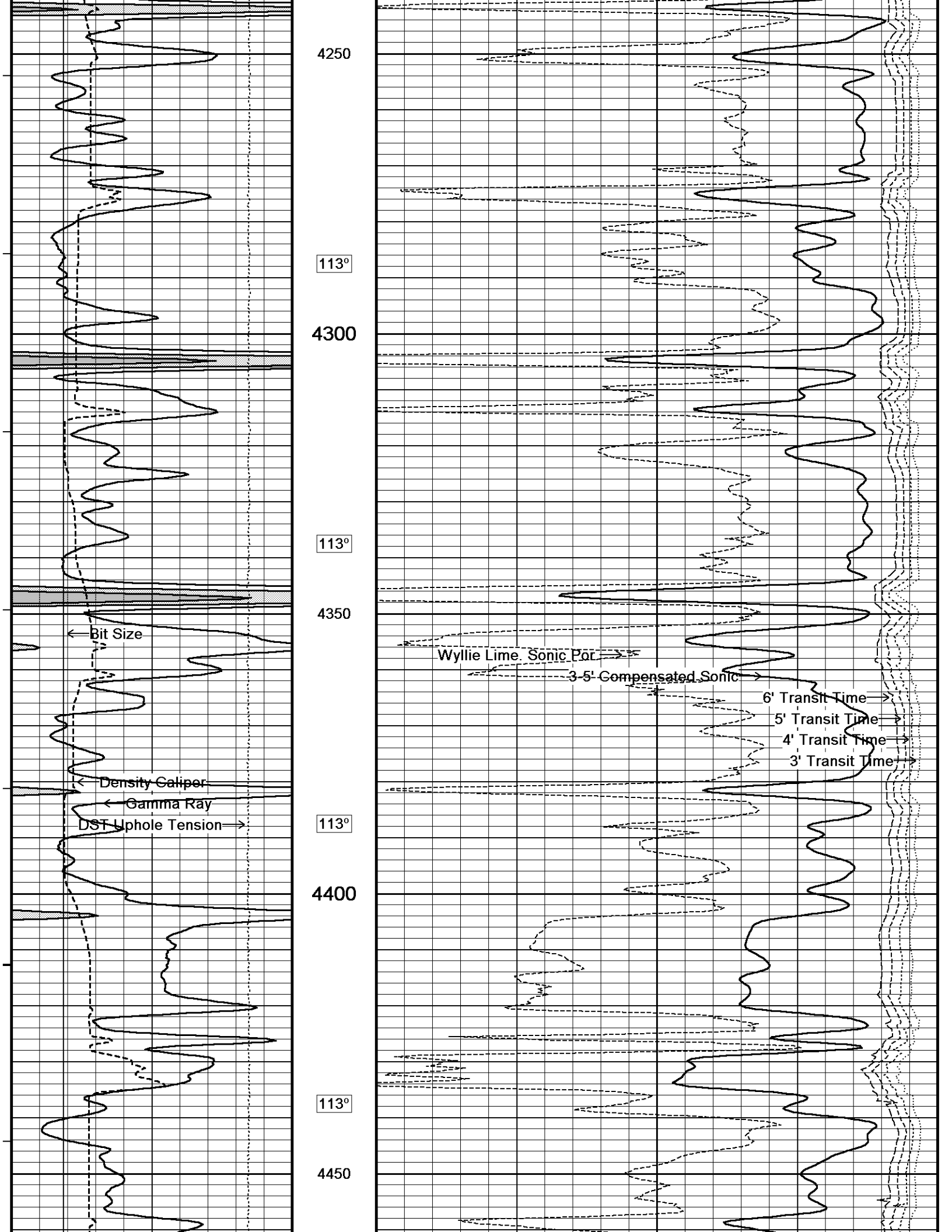

3150
Bit Size
Wyllie Lime. Sonic Por
3-5' Compensated Sonic
6' Transit Time
5' Transit Time
4' Transit Time
3' Transit Time
106°
Density Caliper
3200
Gamma Ray
DST Uphole Tension
107°
3250
107°
3300
107°
3350

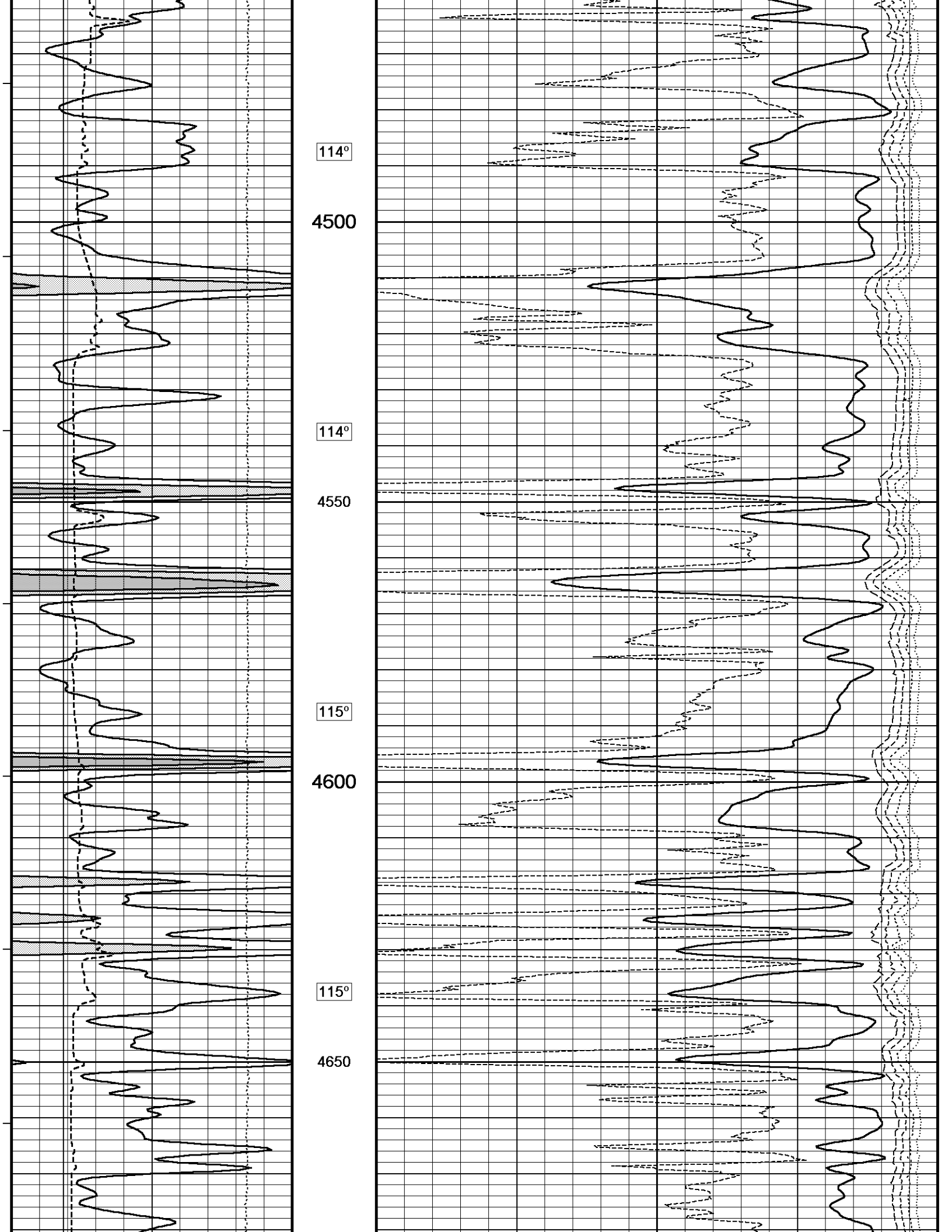

108°
3400
108°
3450
108°
3500
108°
3550
Bit Size
Wyllie Lime. Sonic Por.
3-5' Compensated Sonic
6' Transit Time

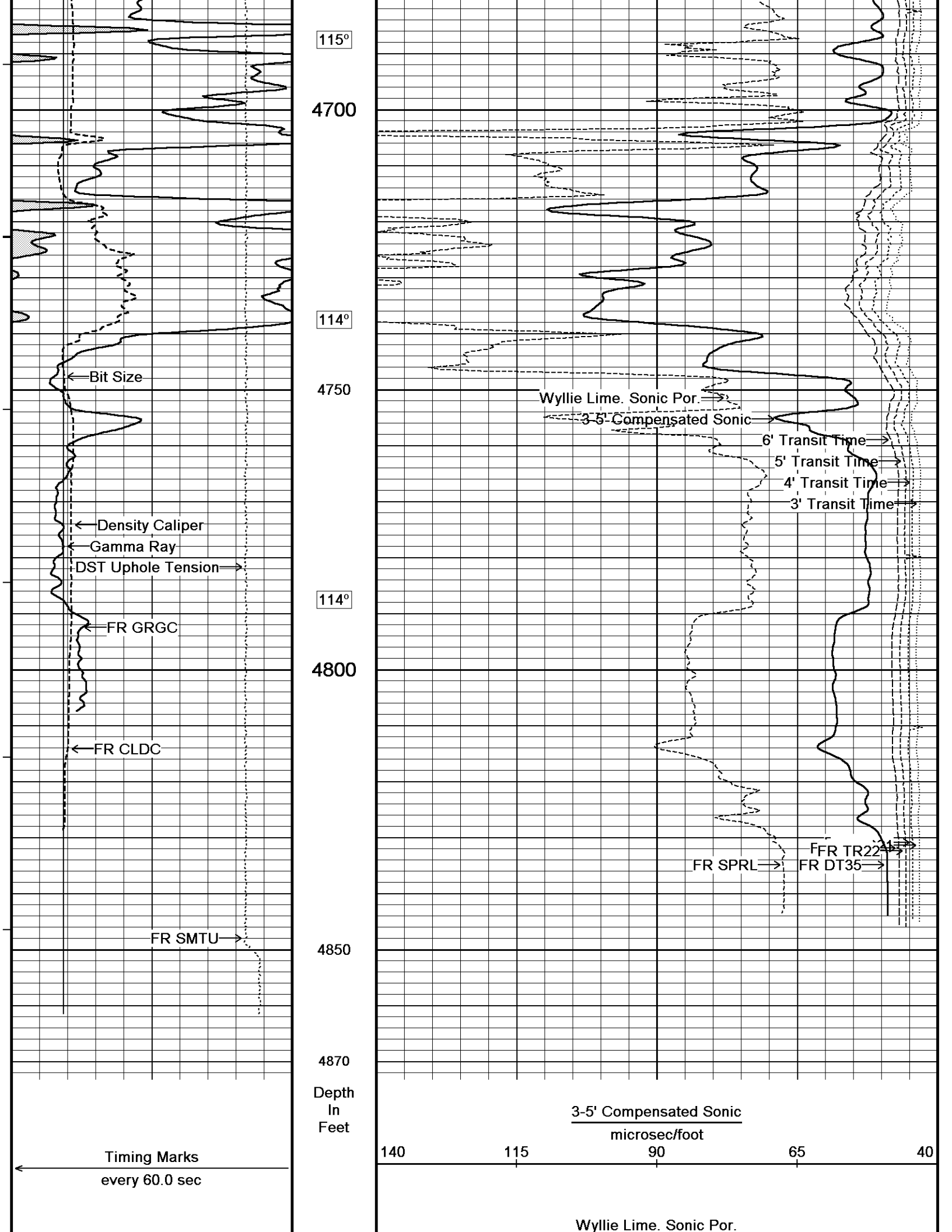

Density Caliper
Gamma Ray
DST Uphole Tension
5' Transit Time
4' Transit Time
3' Transit Time
109°
3600
109°
3650
109°
3700
110°
3750
110°
3800


110°
3850
110°
3900
111°
3950
Bit Size
Wyllie Lime. Sonic Por.
3-5' Compensated Sonic
6' Transit Time
5' Transit Time
4' Transit Time
3' Transit Time
Density Caliper
111°
Gamma Ray
DST Uphole Tension
4000


111°
4050
111°
4100
112°
4150
112°
4200
112°


4250
113°
4300
113°
4350
Bit Size
Wyllie Lime. Sonic Por
3-5' Compensated Sonic
6' Transit Time
5' Transit Time
4' Transit Time
3' Transit Time
Density Caliper
Gamma Ray
DST Uphole Tension
113°
4400
113°
4450


114°
4500
114°
4550
115°
4600
115°
4650


115°
4700
114°
4750
114°
4800
4850
4870
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
FR GRGC
FR CLDC
FR SMTU
Wyllie Lime. Sonic Por.
3-5' Compensated Sonic
6' Transit Time
5' Transit Time
4' Transit Time
3' Transit Time
FR TR22
FR SPRL
FR DT35
Depth
In
Feet
Timing Marks
every 60.0 sec
3-5' Compensated Sonic
microsec/foot
140
115
90
65
40
Wyllie Lime. Sonic Por.

Gamma Ray
API
0 75 150
150 225 300

Density Caliper
inches
6 11 16

Bit Size
inches
6 11 16

DST Uphole Tension
pounds
5000 0

Borehole Temp in deg F

Replay Scale 1:240

percent
30 20 10 0 -10

3' Transit Time
microseconds
1100 100

4' Transit Time
microseconds
1100 100

5' Transit Time
microseconds
1100 100

6' Transit Time
microseconds
1100 100

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 30-JUN-2013 01:23
Filename: C:\Minimus 13.05.9583\Log\Shakespeare Unruh 1-13\Unruh 1-13 MAIN.dta — Recorded on 29-JUN-2013 21:40
System Versions: Logged with 13.05.9583 Plotted with 13.05.9583

5 INCH MAIN

REPEAT SECTION

Depth based Data - Maximum Sampling Increment 10.0cm — Plotted on 30-JUN-2013 01:23
Filename: C:\Minimus 13.05.9583\Log\Shakespeare Unruh 1-13\Unruh 1-13 REPEAT.dta — Recorded on 29-JUN-2013 21:21
System Versions: Logged with 13.05.9583 Plotted with 13.05.9583

Timing Marks
every 60.0 sec

Depth in Feet

3-5' Compensated Sonic
microsec/foot
140 115 90 65 40

Gamma Ray
API
0 75 150
150 225 300

Wyllie Lime. Sonic Por.
percent
30 20 10 0 -10

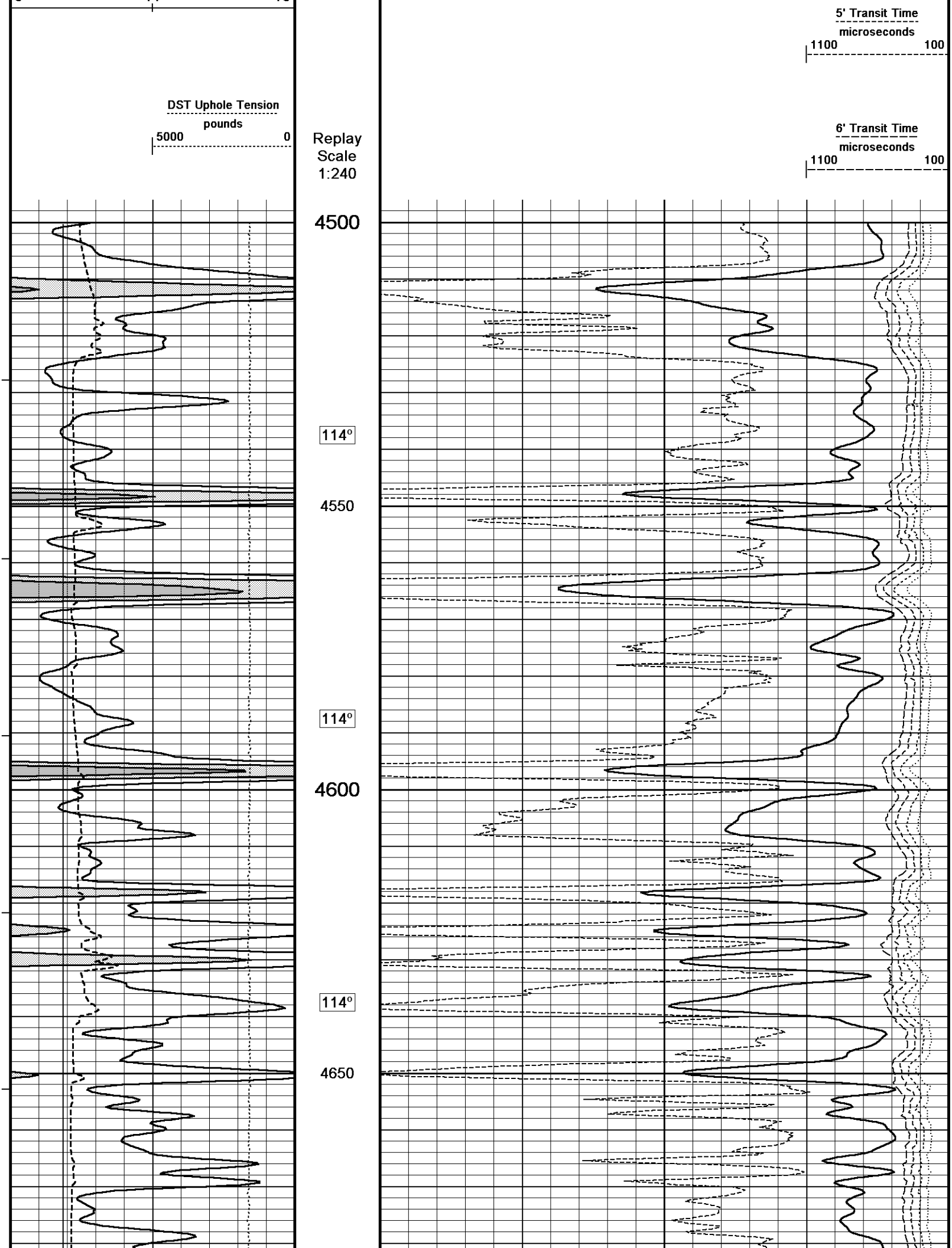
Density Caliper
inches
6 11 16

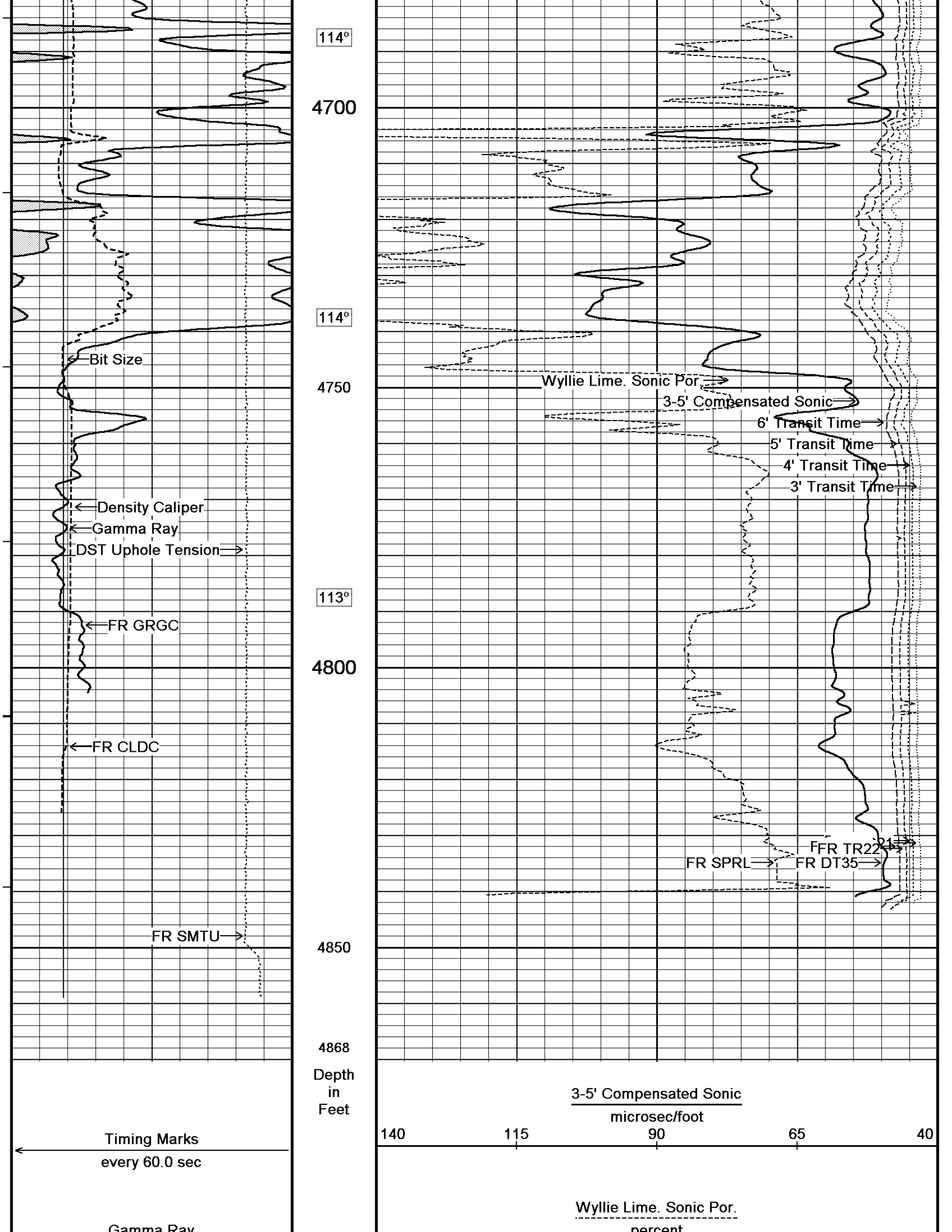
Borehole Temp in deg F

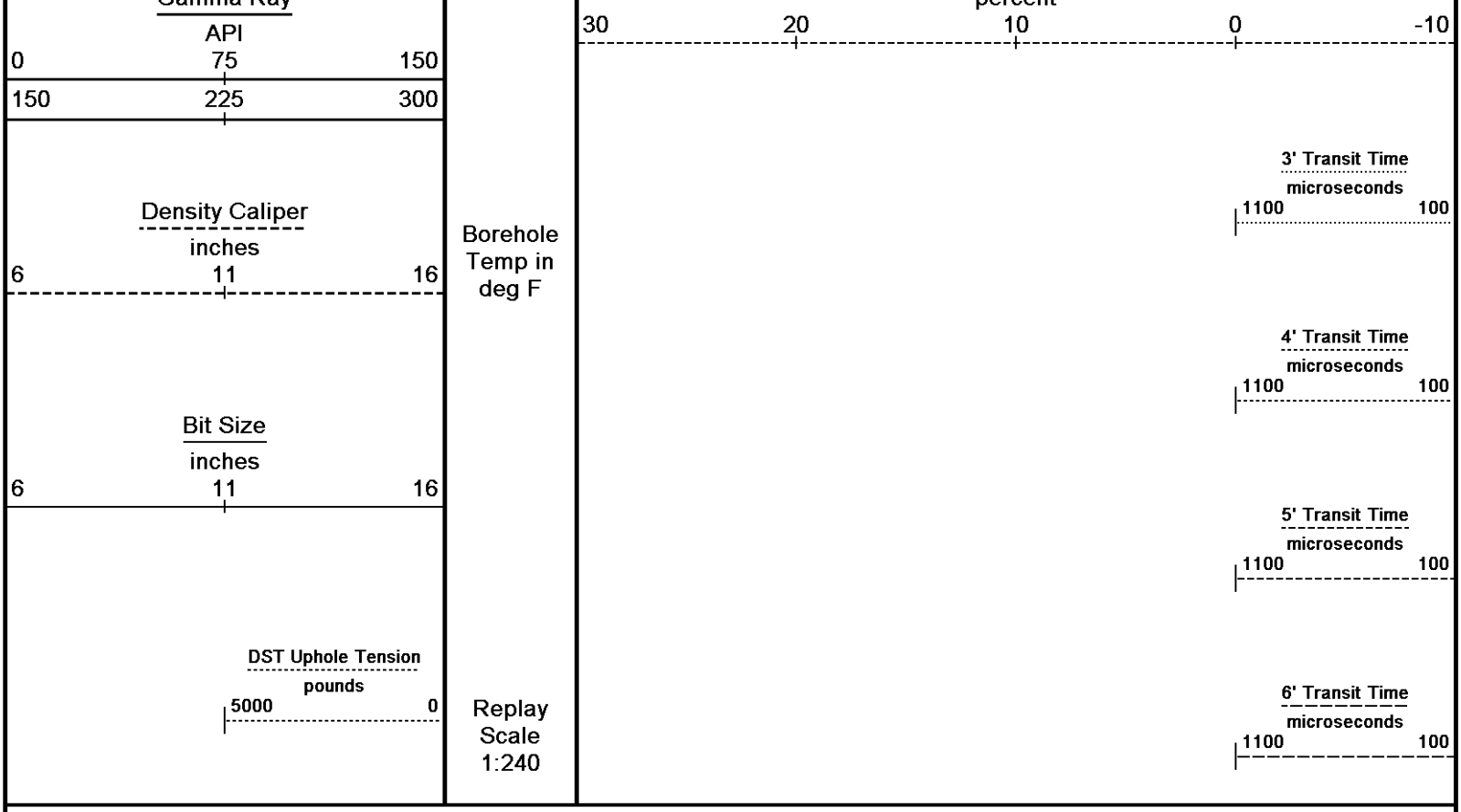
3' Transit Time
microseconds
1100 100

4' Transit Time
microseconds
1100 100

Bit Size
inches
6 11 16


DST Uphole Tension
pounds
5000
0
Replay
Scale
1:240
5' Transit Time
microseconds
1100
100
6' Transit Time
microseconds
1100
100
4500
114°
4550
114°
4600
114°
4650


114°
4700
114°
Bit Size
4750
Wyllie Lime. Sonic Por
3-5' Compensated Sonic
6' Transit Time
5' Transit Time
4' Transit Time
3' Transit Time
Density Caliper
Gamma Ray
DST Uphole Tension
113°
FR GRGC
4800
FR CLDC
FR TR22
FR SPRL
FR DT35
FR SMTU
4850
4868
Depth
in
Feet
3-5' Compensated Sonic
microsec/foot
140
115
90
65
40
Timing Marks
every 60.0 sec
Wyllie Lime. Sonic Por.
percent
Gamma Ray



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 30-JUN-2013 01:23
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System Versions: Logged with 13.05.9583 Plotted with 13.05.9583

REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 13.05.9583\Log\Shakespeare Unruh 1-13\Unruh 1-13 REPEAT.dta

General Constants All 000

Last Edited on 29-JUN-2013,19:31

General Parameters		
Mud Resistivity	0.550	ohm-metres
Mud Resistivity Temperature	78.000	degrees F
Water Level	0.000	feet
Borehole Fluid Processing	Wet Hole	
Hole/Annular Volume and Differential Caliper Parameters		
HVOL Method	Single Caliper	
HVOL Caliper 1	Density Caliper	
HVOL Caliper 2	N/A	
Annular Volume Diameter	5.500	inches
Caliper for Differential Caliper	MML Caliper	
Rwa Parameters		
Porosity used	Crossplot Porosity	
Resistivity used	Array Ind. Six Res Rt	
RWA Constant A	1.000	
RWA Constant M	2.000	
SW/APOR Tool Source	0.000	

Gamma Calibration MCG-D.K 469

Field Calibration on 28-JUN-2013 10:15

	Measured	Calibrated (API)
Background	78	54
Calibrator (Gross)	1127	779
Calibrator (Net)	1049	725

Gamma Constants MCG-D.K 469

Last Edited on 29-JUN-2013,19:15

Gamma Calibrator Number	CPC38

Gamma Calibrator Number	GRC38	
Mud Density	1.11	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl		kppm
K Mud Type	Chloride	
K Mud Concentration	0.00	%

High Resolution Temperature Calibration MCG-D.K 469

Field Calibration on 28-JUN-2013,10:23

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	100.00	100.00

High Resolution Temperature Constants MCG-D.K 469

Last Edited on 28-JUN-2013,10:23

Pre-filter Length	11

Sonic Constants MSS-C.K 330

Last Edited on 29-JUN-2013,19:32

Maximum Boundary Contrast	100.00	micro-sec/ft
Fluid Transit Time	189.00	micro-sec/ft
Limestone Transit Time	47.50	micro-sec/ft
Sandstone Transit Time	55.50	micro-sec/ft
Dolomite Transit Time	43.50	micro-sec/ft
Sonic used for Porosities	3-4' Compensated Sonic	
Correction for Sonde Skew	Applied	
Cycle Stretch Algorithm	Applied	
MN3FT	N/A	micro-sec
MX3FT	N/A	micro-sec
Hunt-Raymer Constant	83.13	micro-sec/ft
Sonde Mode	Compensated	
Hole Type	Open Hole	

Sonde Parameters

	Measured	Calibrated
Offset	N/A	0.0000
Free Pipe	N/A	N/A

Peak Amplitude Source N/A

Waveform	Start Time (micro-sec)	Width (micro-sec)	Pre Gain	Start Gain	Discriminator (mV)
3'	N/A	N/A	N/A	N/A	N/A
4'	N/A	N/A	N/A	N/A	N/A
5'	N/A	N/A	N/A	N/A	N/A
6'	N/A	N/A	N/A	N/A	N/A

Processed Fixed Gate Parameters

Waveform Used For Processing N/A

Start Time (micro-sec)	End Time (micro-sec)	Discriminator (mV)	N/A
N/A	N/A	N/A	
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	

Full Waveform Parameters

Use 3' Waveform to derive TR	N/A	
Use 4' Waveform to derive TR	N/A	
Use 5' Waveform to derive TR	N/A	
Use 6' Waveform to derive TR	N/A	
3' Waveform Discriminator Level	N/A	mV
4' Waveform Discriminator Level	N/A	mV
5' Waveform Discriminator Level	N/A	mV
6' Waveform Discriminator Level	N/A	mV
3' Waveform Filter	N/A	
4' Waveform Filter	N/A	
5' Waveform Filter	N/A	
6' Waveform Filter	N/A	

Semblance Level	N/A	
Semblance Window Width	N/A	micro-sec
Sonic 1 Despiker	N/A	N/A
Sonic 2 Despiker	N/A	N/A

Caliper Calibration MPD-B 64

Base Calibration on 21-MAY-2013 17:34
Field Calibration on 28-JUN-2013 10:03

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14464	3.99
2	23406	5.98
3	32206	7.97
4	40368	9.86
5	50018	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
6.02	5.98

DOWNHOLE EQUIPMENT

C:\Minimus 13.05.9583\Log\Shakespeare Unruh 1-13\Unruh 1-13 REPEAT.dta

CBH-C, Cablehead, 11 pin
CBH-CA 900 LG: 2.40 ft WT: 24.3 lb OD: 2.24 in

Compact Comms Gamma
MCG-D.K 469 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in
- 55.39 ft GRGC - Gamma Ray
- 52.48 ft CGXT - MCG External Temperature

Compact Micro-log
MML-A 3 LG: 7.97 ft WT: 81.6 lb OD: 2.24 in
- 45.76 ft MINV - Micro-inverse
- 45.76 ft MNRL - Micro-normal
- 46.76 ft MLTC - MML Caliper

Compact Neutron
MDN-A.B 66 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in
- 40.97 ft NPRL - Limestone Neutron Por.

Compact Density/Caliper
MPD-B 64 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in
- 33.73 ft AVOL - Annular Volume
- 33.73 ft HVOL - Hole Volume
- 33.73 ft CLDC - Density Caliper
- 31.80 ft DPRL - Limestone Density Por.
- 31.80 ft DEN - Compensated Density
- 31.80 ft DCOR - Density Correction
- 31.74 ft PDPE - PE

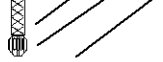
Compact Focussed Electric
MFE-B.J 353 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in
- 26.24 ft FEFE - Shallow FE

Compact Sonic
MSS-C.K 330 LG: 12.52 ft WT: 72.8 lb OD: 2.24 in
- 12.96 ft DT35 - 3-5' Compensated Sonic
- 12.96 ft SPRL - Wyllie Lime. Sonic Por.

Compact Induction
MAI-A.A 167 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in
- 3.34 ft R40O - Array Ind. One Res 40
- 3.34 ft RTAO - Array Ind. One Res Rt
- 3.34 ft R60O - Array Ind. One Res 60
- 0.23 ft SPCG - Spontaneous Potential
- Tool Zero (0.13ft from bottom)
- -0.13 ft SMTU - DST Uphole Tension

Total Length: 63.07 ft Weight: 480.6 lb

All measurements relative to tool zero



All measurements relative to tool zero.

COMPANY	SHAKESPEARE OIL COMPANY
WELL	UNRUH 1-13
FIELD	WILDCAT
PROVINCE/COUNTY	SCOTT
COUNTRY/STATE	UNITED STATES / KANSAS

Elevation Kelly Bushing	3113.00	feet	First Reading	4835.00	feet
Elevation Drill Floor	3112.00	feet	Depth Driller	4850.00	feet
Elevation Ground Level	3106.00	feet	Depth Logger	4848.00	feet

Weatherford®

COMPENSATED SONIC WITH INTEGRATED TRANSIT TIME LOG